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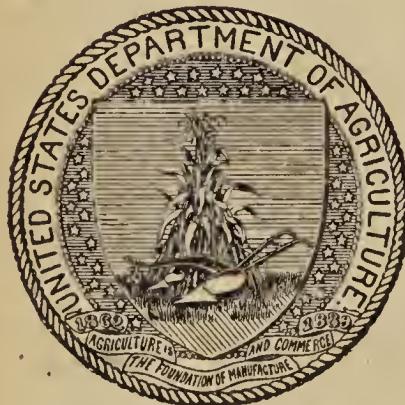
U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF ANIMAL INDUSTRY.

STATES A. D. MELVIN, CHIEF OF BUREAU.

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EXPERIMENT STATION

# THE OPHTHALMIC TEST FOR GLANDERS



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**THE OPHTHALMIC TEST FOR GLANDERS.**

During the past few years the ophthalmic mallein test has gained great favor in the diagnosis of glanders. The popularity of the test is rapidly gaining wherever this method has been applied, and among its supporters we find at the present time the best authorities on the subject of glanders and on clinical diagnosis.

The Bureau of Animal Industry, in consideration of the favorable results obtained from this test in other countries, has for a period of more than a year carried out extensive investigations with a concentrated mallein. For this purpose the cooperation of official and practicing veterinarians was solicited in various parts of the country. Ophthalmic mallein was furnished to all practitioners who desired to make a careful study of the method and establish its comparative value with other tests for glanders, especially the subcutaneous mallein test. In this experimental work about 18,000 horses have been subjected to the ophthalmic test, and in most cases it has been applied simultaneously with the subcutaneous mallein test. The data collected from the reports of a great number of veterinarians indicate satisfactory results from the eye test, and those who employed the method appear to be unanimous in their preference of the eye test over the subcutaneous test.

The comparative diagnostic tests for glanders which have been carried out by the Bureau of Animal Industry in connection with immunization experiments in glanders, and in several outbreaks of the disease, proved the eye

test to be reliable and most practicable. In most of these instances the results were controlled by post-mortem examinations.

As a result of these favorable findings the bureau has decided to recognize this method of diagnosis for the interstate shipment of equines.

This method has a great advantage over others by its very simple application. It may be readily executed by any veterinarian, and its other advantages are that the results are obtained in a comparatively short time and are, as a rule, distinct and definite. The simplicity of its application is plainly manifest when compared to the subcutaneous test, as it is only necessary to drop into one of the eyes of the animal to be tested 3 drops of concentrated mallein or, by a still simpler procedure, to dip a camel's hair brush into mallein and introduce this into the conjunctival sac of the animal. The reaction usually commences in 5 to 6 hours after the introduction of the mallein, and lasts from 24 to 36 hours. A positive reaction is manifested by a purulent secretion from the tested eye. This may be very profuse or slight, sometimes associated with a severe conjunctivitis and edema of the lids and at other times without any inflammatory symptoms being present. At times only a very small quantity of pus may be present in the inner canthus of the eye. At other times the reaction may result in a true pyorrhea. The reaction manifests itself in varying degrees in different animals, but the intensity of the reaction has no relation to the extent of the disease in the reactor.

The essential factor in obtaining satisfactory results from the test appears to be in the use of the right kind of mallein. It must be by all means a concentrated mallein, and apparently the best results follow the use of raw or precipitated mallein, the former representing the mallein obtained after the concentration of the filtrate from the bouillon cultures of the glanders bacilli. The ordinary mallein used for subcutaneous testing is not adaptable, and the few failures which have been reported in the literature were due to the fact that the mallein employed was not sufficiently concentrated.



by applying the brush gently along the inner surface of both the upper and lower eyelids. The other eye is not treated, but serves as a control for comparison of the reaction. For the testing of horses in the same stable the same dropper or camel's-hair brush may be used for all animals, but the dropper or brush should be sterilized before use upon different lots of horses.

As soon as the mallein is introduced into the eye practically all animals show a lacrimation, increased reddening of the conjunctiva, and slight photophobia. No significance should be given to these symptoms. They disappear in one or two hours. A pseudo-reaction can be produced by artificial or accidental irritation of the eye.

The characteristic manifestation of the reaction for glanders commences as a rule from 5 to 6 hours and lasts 24 to 36 hours, sometimes longer. It consists of a purulent discharge from the conjunctival sac which is typical and is frequently associated with reddening, swelling, and gluing of the eyelids. It is advisable to examine the tested animals in a good light from 12 to 24 hours, or preferably 16 hours, after the application of the test.

A suppurative discharge of varying quantities is considered a positive reaction. The conjunctiva and the eyeball should also be included in the examination after examining the discharge. By removing the purulent discharge (either by the stable attendant or by the animals licking each other, etc.) the positive result may be obliterated. In such cases dried pus may be frequently found on the parts around the eye, or the exposure of the conjunctiva by means of pressure by the thumb and finger will show fresh, purulent material.

Generally the positive ophthalmic reactions are not accompanied by fever or systemic disturbances. Occasionally, however, affected horses are hypersensitive to such a degree that even the few drops of mallein placed in the eye may enter the circulation and produce fever. Therefore, it is advisable, when possible, to accompany the ophthalmic reaction with temperature readings. For this purpose the temperature should be taken twice, the first time when the eye test is being made, and the second time

when it is judged. In a doubtful eye reaction where there is an increased temperature of  $1\frac{1}{2}$ ° F., the test should be considered positive if the animal had a normal temperature at the time the test was made.

In the absence of any secretion the test should be considered negative. When there is a mucous secretion or lacrimation during the period of reaction the test must be considered as atypical, and in such cases it may be repeated the same day, when as a rule the results are more confirming.

The application of the ophthalmic test should not be repeated more than three times on the same animal within a short period, as experiments show that the reaction after the third application made within three months usually loses its intensity in positive cases and on subsequent tests may be entirely absent. In cases where the results of the second test immediately following the first test are atypical, the blood of such animals may be drawn and forwarded to a laboratory for the serum diagnosis, as the instillation of ophthalmic mallein does not influence this method of diagnosis. From experience gained with the eye test such a procedure would become necessary only in a comparatively few cases. In the control of glanders, animals may be retested every six months with satisfactory results.

The mallein for the eye test is a clear, sirupy, dark brown liquid, giving off a rancid, disagreeable odor. This mallein is supplied in small vials of three sizes containing, respectively, 1 cubic centimeter, 2 cubic centimeters, and 3 cubic centimeters of mallein. One cubic centimeter is sufficient for testing 10 horses. Each bottle is dated, and the mallein is not recommended for use longer than three months after the date on the bottle. The bureau will be in a position to fill orders promptly, therefore only sufficient amounts for immediate needs should be requested. Partly used bottles should not be kept over from one day to another. The portion of mallein unused at the end of a day should be discarded.

## INSTRUCTIONS FOR RECORDING TEST.

The results of the test should be recorded as follows:

N = Negative. Eye unchanged.

S = Suspicious. Seromucous discharge.

P + = Positive. Seromucous discharge with purulent flakes.

P ++ = Positive. Distinct purulent discharge.

P ++ = Positive. Purulent discharge with swelling of the eyelids.

P + + + = Positive. Strong purulent discharge with swelling and gluing together of both lids.







